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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/600,206	11/13/2000	Graham O'Neill	22749/04002	7913

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EXAMINER

MICHALSKI, JUSTIN I

ART UNIT	PAPER NUMBER
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2644

DATE MAILED: 06/21/2004

14

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/600,206

Applicant(s)

O'NEILL ET AL.

Examiner

Justin Michalski

Art Unit

2644

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 14-40 is/are rejected.
- 7) ☒ Claim(s) 10-12 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. Claim 33 has been canceled.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1 and 40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "the input" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 40 recites the limitation "the input" in line 4. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-7, 13, and 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toumazou et al. (Hereinafter "Toumazou") (Electronic Letters, No. 22, Oct. 27, 1994, pps. 1839-1841) in view of Orban (US Patent 4,525,857).

Regarding Claim 1, Toumazou discloses an analogue signal processor (Figures 1-3), comprising an audio input signal (I_{in}), an output for providing a processed audio output signal (I_{out}), and a tone control circuit coupling the input and the output (Toumazou discloses frequency selective ability (i.e. tone control) of a set of filters) (Introduction, lines 1-3) and comprising first and second log-domain filters having different low-pass bands (Figure 3, cascaded low-pass filters) where each of the filters comprise of MOS transistors operating in weak inversion (Toumazou discloses transistors in weak inversion) (Page 1840, column 2, simulation, lines 5-6). Although Toumazou discloses a cascaded low-pass filters in figure 3 producing a low frequency cutoff response shown in figure 4, Toumazou does not disclose a subtractor for subtracting the output currents of the filters to produce a filtered signal. Orban discloses a circuit for producing a low frequency cutoff of a network by using lowpass filters (Figure 2, filters 60 and 62) and subtractor 76. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a subtractor for subtracting the output of filters in order to produce a low frequency cutoff of the circuit network (Orban, Column 7, lines 30-34) in order to meet the frequency selective function of a cochlea (Toumazou, cutoff frequency of figure 4).

Regarding Claim 2, Toumazou further discloses a log converter (i.e. compressor) (Figure 2) coupling the input of a tone control circuit for compressing the dynamic range of the input signal.

Regarding Claim 3, it would have been obvious to one of ordinary skill in the art at the time the invention was made that a voltage-to-current converter would be a

possible mode of implementation for the compressor as illustrated by Waldhauer (US Patent 4,882,761) (Column 2, lines 51-56).

Regarding Claim 4, Toumazou further discloses the MOS transistors operating in weak inversion (Column 2, paragraph 2).

Regarding Claim 5, Toumazou further discloses that compressor compresses the dynamic range of the input and amplifies weak signals (i.e. controls sensitivity) (Column 2, paragraph 2).

Regarding Claim 6, it would have been obvious to one of ordinary skill in the art at the time the invention was made that an amplifier could be placed after the tone control circuit for increasing the output to a desired level.

Regarding Claim 7, Toumazou further discloses the input of Figure 2 being a current source (i.e. current signal).

Regarding Claim 13, Toumazou further discloses Figure 1 only having one output (I_{out}).

Regarding Claim 26, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the device could be implemented on a single chip using integrated circuit technology.

Regarding Claim 27, Toumazou further discloses the log-domain filter for use in an electronic cochlea (i.e. aural prosthetic) (Column 1, paragraph 1).

Regarding Claim 28, Toumazou further discloses the log-domain filter for use in an electronic cochlea (i.e. hearing aid) (Column 1, paragraph 1).

Regarding Claim 29, Toumazou further discloses the log-domain filter for use in an electronic cochlea (i.e. cochlear implant) (Column 1, paragraph 1).

6. Claim 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toumazou as modified as applied to claim 1 above, and further in view of Shannon et al. (US Patent 5,549,658).

Regarding Claim 8, as stated above apropos of claim 1, Toumazou makes obvious all elements of that claim but does not disclose a biphasic signal generator for supplying a biphasic signal. Shannon et al. discloses a biphasic signal generator (Figure 5, generator 72) for supplying to the output a biphasic signal modulated by the processed audio output signal. Shannon et al. teaches biphasic signals permit signals to be inductively coupled through the skin with reasonable efficiency (Column 15, lines 27-35). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a biphasic signal to efficiently couple an electric signal through the skin.

Regarding Claim 9, Toumazou discloses a processor as stated in claim 1 but does not disclose full-wave rectification. Shannon discloses the use of full-wave rectifier circuits RECT1-4 and effectively derives the instantaneous envelope of the audio signals in the band. (Column 12, line 65 through Column 13, line 4). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include full-wave rectifiers to effectively derive the instantaneous envelope of the audio signal as taught by Shannon.

7. Claims 14-17 and 21-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toumazou as modified as applied to claim 1 above, and further in view of Michelson (US Patent 4,400,590).

Regarding Claim 14, as stated above apropos of claim 1, Toumazou makes obvious all elements of that claim and discloses a tone control (frequency selective ability (i.e. tone control) of a set of filters) (Introduction, lines 1-3) for adjusting the intensity/frequency of the processed audio signal. Toumazou does not disclose a plurality of outputs. Michelson discloses an audio signal processing circuit (Figure 1) comprising a plurality of outputs (output of drivers 16) for improvement in speech discrimination over a single output (Column 1, line 64 through Column 2, line 6). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a plurality of signals for producing an array of outputs for enhancing the discrimination of an audio signal.

Regarding Claim 15, Michelson further discloses frequency separation means for separating the intensity/frequency adjusted audio signal into a plurality of frequency-separated signals having different frequency bands (Michelson discloses the filters separate the amplified signals into frequency component bands) (Column 3, lines 22-23).

Regarding Claim 16, Michelson further discloses the filters (14) being bandpass filters (Column 5, lines 3-6).

Regarding Claim 17, Toumazou et al. further discloses (Figure 2) the use of log-domain filters comprising of MOS transistors (Column 2, paragraph 2).

Regarding Claim 21, as stated above apropos of claim 1 Toumazou makes obvious all elements of that claim. Toumazou does not disclose the intensity/frequency response of the tone control unit is controllable by a user. Michelson discloses the frequency components (i.e. frequency/intensity response of the tone control circuit) can be shaped to the requirements of the individual user (Column 2, lines 40-43). Therefore, it would have been obvious to one of ordinary skill at the time the invention was made to allow the components to be adjustable in order to customize the output to the individual user.

Regarding Claim 22, Michelson further discloses means for adjusting the treble response and bass response of the electrical signal (Column 6, lines 15-20)

Regarding Claim 23, Michelson further discloses means for adjusting the treble boost and bass boost of the signal (Column 6, lines 15-20).

Regarding Claim 24, Michelson further discloses means for adjusting the level of amplification for each frequency component (i.e. signal amplitude) (Column 5, lines 12-16).

Regarding Claim 25, as stated above apropos of claim 1, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a subtractor to produce a filtered output. Michelson further discloses filters 14 having an amplifier 12 controlling the input amplitude into the filters.

8. Claims 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toumazou as modified as applied to claim 15 above, and further in view of Shannon et al. (US Patent 5,549,658).

Regarding Claim 18, as stated above apropos of claim 15 Toumazou as modified makes obvious all elements of that claim. Toumazou as modified does not disclose biphasic signals. Shannon discloses a plurality of biphasic signal generators (outputs of 71) for supplying biphasic signals modulated by respective ones of the frequency-separated signals (outputs of LM1-4) to respective ones of the outputs. Shannon et al. teaches biphasic signals permit signals to be inductively coupled through the skin with reasonable efficiency (Column 15, lines 27-35). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a biphasic signal to efficiently couple an electric signal through the skin.

Regarding Claim 19, Shannon further discloses sampling means for applying samples of the frequency-separated signals to the respective biphasic signal generators (Column 14, lines 7-24).

Regarding Claim 20, Shannon further discloses the sampling means comprises a continuous interleaved sample generator (Column 3, lines 42-46).

9. Claims 30, 31, 34, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Michelson (US Patent 4,400,590) in view of Toumazou et al. (Electronic Letters, No. 22, Oct. 27, 1994, pps. 1839-1841).

Regarding Claim 30, Michelson discloses a multi-channel analog audio signal processor for use with a cochlear prosthesis (Figure 1), comprising: an input for receiving an audio signal (transducer 10); a plurality of outputs for connection to respective ones of cochlear implant electrodes (output of drivers 16); a plurality of analog signal processing channels coupled to the input, each channel comprising a filter coupled to a respective one of the outputs (Filters 14); a tone generator (Figure 1) for generating tones of preset amplitude and frequency (18) dependent on the fundamental frequencies of the filters (14) of the channels; and adjustment means (filters 14 and drivers 16) for adjusting the intensity/frequency response of each channel (Michelson discloses frequency components can be shaped to the requirements of the user) (Column 2, lines 40-43). Michelson does not disclose the use of log-domain filters or MOS transistors operating in weak inversion. Toumazou et al. discloses a signal processing circuit (Figure 2) of a log-domain filter employing MOS transistors operating in weak inversion. Toumazou et al. teaches the class of filter having a very high dynamic range, good linearity, and high frequency performance (Column 1, Paragraph 2 through Column 2 Paragraph 1). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the use of log-domain filters and MOS transistors with the signal processor to produce a higher dynamic range as taught by Toumazou et al.

Regarding Claim 31, Michelson further discloses each channel comprising an amplifier (driver 15) having controllable gain (Column 5, lines 12-16).

Regarding Claim 34, Michelson further discloses tone generator control means for selecting the frequency of the tone produced by the tone generator (frequency components can be shaped to the requirements of the user (i.e. frequency can be selected)) (Column 2, lines 40-43).

Regarding Claim 36, Michelson further discloses separate filters (14) and drivers (16) that can independently adjusted by channel.

10. Claim 35 rejected under 35 U.S.C. 103(a) as being unpatentable over Michelson as modified as applied to claim 34 above, and further in view of Müller. Michelson as modified discloses a processor as stated apropos of claim 34 but does not disclose control transmitted by a wireless remote control. Müller et al. discloses an implantable device whose audiological functions can be transcutaneously controlled by remote control to adapt to ambient acoustic conditions (Column 11, lines 25-41). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a remote control to change operating parameters for adapting to ambient acoustical conditions resulting in a higher quality audio signal.

11. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Michelson as modified as applied to claim 30 above, and further in view of Müller et al. (US Patent 5,814,095). Michelson as modified discloses a processor as stated apropos of claim 32 but does not disclose use adjustments transmitted by a wireless remote control. Müller et al. discloses an implantable device whose audiological functions can

be transcutaneously controlled by remote control to adapt to ambient acoustic conditions (Column 11, lines 25-41). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a remote control to change operating parameters for adapting to ambient acoustical conditions resulting in a higher quality audio signal.

12. Claims 37 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Michelson as modified as applied to claim 30 above, and further in view of Zierhofer (US Patent 5,983,139).

Regarding Claim 37, Michelson as modified discloses a processor as stated in claim 30 but does not disclose sampling means coupling the channels to the outputs. Zierhofer discloses continuous interleaved sampling successfully achieved high levels of speech recognition (Column 1, lines 13-16). Therefore, it would have been obvious to one of ordinary skill at the time the invention was made to implement sampling to create a high level of speech recognition.

Regarding Claim 38, Zierhofer further discloses the sampling means comprises a continuous interleaved sample generator (Column 1, lines 13-16).

13. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Michelson as modified as applied to claim 30 above, and further in view of Shannon (US Patent 5,549,658). Michelson as modified discloses a processor as stated in claim 30 but does not disclose the use of biphasic generators. Shannon discloses sampling

means for applying samples of the frequency-separated signals to the respective biphasic signal generators (Column 14, lines 7-24). Shannon et al. teaches biphasic signals permit signals to be inductively coupled through the skin with reasonable efficiency (Column 15, lines 27-35). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a biphasic signal to efficiently couple an electric signal through the skin.

Response to Arguments

14. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's arguments, see pages 9-10, filed 5 April 2004, with respect to the rejection(s) of claim(s) 30 under 35 USC § 103 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of different interpretation of the previously applied reference.

Allowable Subject Matter

15. Claims 10-12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Justin Michalski whose telephone number is (703)305-5598. The examiner can normally be reached on 8 Hours, 5 day/week.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Isen can be reached on (703)305-4386. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JIM



**FORESTER W. ISEN
SUPERVISORY PATENT EXAMINER**